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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/765,881

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Toshiyuki Suzuki

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EXAMINER

OLSEN, KAJ K

ART UNIT

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1795

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/765,881	Applicant(s) SUZUKI ET AL.	
	Examiner KAJ K. OLSEN	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 March 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) See Continuation Sheet is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) See Continuation Sheet is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Continuation of Disposition of Claims: Claims pending in the application are
1,3,5,7,11,13,17,19,23,25,27,29,31,33,35,37,39,43,45,49-51,53,59,61,67,69 and 75-144.

Continuation of Disposition of Claims: Claims rejected are 1,3,5,7,11,13,17,19,23,25,27,29,31,33,35,37,39,43,45,49-
51,53,59,61,67,69 and 75-144.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 3, 5, 7, 11, 13, 17, 19, 23, 25, 27, 35, 37, 39, 43, 45, 49-51, 53, 59, 61, 75-85, 89-92, 94-97, 100-108, 113-118, 123-126, 131, 133-139, and 144-146 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Suzuki et al (USP 6,478,940) (hereafter “Suzuki ‘940”).

3. With respect to claims 1, 3, 5, 7, 11, 13, 17, 19, 23, 25, 27, 35, 37, 39, 43, 45, 49-51, 53, 59, 61, 75-85, 89-92, and 94-97, these claims were previously rejected over the teaching of Suzuki ‘940 for the reasons set forth in the 6/9/2008 office action. Applicant has amended claims 1, 39, 45, 49, 75, and 94 to specify that the limiting current region of the voltage level varies due to the decomposition of the water such that the width of the limiting current region in a rich region is narrower in rich region. This limitation does not appear to further define the actual sensor as it appears to be merely describing how a sensor's response varies with the air/fuel ratio the sensor is exposed to and there is no indication that the limit current region varying with water decomposition was somehow unique to the sensor of the present invention. Whether or not the decomposition of water affects the location of the second voltage point doesn't further define the actual sensor itself. Applicant's invention would not appear to the

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discovery of the decomposition of water by the sensor under rich conditions, but rather how applicant responded to that discovery. See the specification p. 3, ll. 10-18 and p. 4, ll. 8-16.

However, as the examiner has pointed out in the previous office action, applicant hasn't defined the sensor that responds to this discovery in a manner that reads free of the means utilized by the prior art. In particular, as the examiner pointed on in the 10/1/2007 and 6/9/2008 office actions, an applied voltage line chosen by the prior art methods (i.e. matching the line to a DC impedance of the sensor) would still read on the line as defined by the apparatus of the present invention.

Whether or not an applied voltage line is chosen based on the discovery of the presence of water decomposition in rich air/fuel ratios or based on other criteria does not further define the actual choice of line or thereby the structure of the apparatus.

4. With respect to new claims 100-108, 113-118, 123-126, 131, 133-139, 144-146, these claims are either just further defining how the apparatus is to be utilized (e.g. claim language such as "fixes", "is set", "is shifted", etc. is just define how the apparatus is to be utilized), or are defining how the gas sensor behaves under the influence of the water decomposition. Neither of these types of limitations are further defining the structure of the claimed invention, but are reciting either the intended use of the device or describing inherent properties of the gas sensor under rich air/fuel conditions. Moreover as discussed in the previous office action, even if a number of these limitations drawn to the intended use were to be given further due consideration, Suzuki '940 already discloses a number of their features (e.g. Suzuki '940 already taught that the voltage levels are changeable with temperature). See the 6/9/2008 office action.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 3, 5, 7, 11, 13, 17, 19, 23, 25, 27, 35, 37, 39, 43, 45, 49-51, 53, 59, 61, 75-85, 89-92, 94-97, 100-108, 113-118, 123-126, 131, 133-139, and 144-146 in the alternative are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki '940 in view of JP 08-029,388 (hereafter "JP '388").

7. As discussed above and in the previous 6/9/2008 office action, the examiner does not believe applicant has defined its applied voltage line in a manner that reads away from the means of the prior art. Whether or not the prior art recognized that water decomposition affected the limit current behavior of the gas sensor doesn't by itself further define the choice of applied voltage line. However, even if the examiner were to interpret the reasons for utilizing the various lines as further defining either the lines or the apparatus itself, then many of these choices of lines would be obvious over the further teaching of JP '388. In particular, JP '388 recognized that the gas concentration detection range should be divided up into a plurality of portions to ensure that the voltage utilized at each current was within the limit current region for that current. JP '388 also recognized that the width of the limit current regions may be different at different A/F ratios with the width being narrower at rich levels in comparison with lean levels. In response, JP '388 suggested the use of an applied voltage line that was overall shallower than the line that would correspond to resistance governing region relied on by Suzuki '940.

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Compare fig. 4 and 7 and see paragraphs 0019-0022. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of JP '388 and utilize a linear applied voltage line for Suzuki '940 that is shallow enough to extend through all the limit current regions for the sensor in order to ensure that the choice of voltage for each current point is safely with a limit current region for that current.

8. Claims 29, 31, 33, 86-88, 99, 109-112, 119-122, 127-130, 132, and 140-143 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki '940 or Suzuki '940 in view of JP '388 as applied above, and further view of Takami et al (USP 5,935,400). Takami is being cited and relied on for the first time with this office action.

9. These claims are drawn to the use of a characteristic line that has a larger inclination in an outer region and in a resistance governing region than in the limit current region. Suzuki '940 and JP '388 do not explicitly suggest doing so. However, Takami teaches that the voltage level at the outer regions of the characteristic line L11 and L13 can be set to be at constant voltages to keep the sensor from generating excessive current. See fig. 18 and col. 20, ll. 32-49. Hence, Takami suggest the use of a characteristic line in the outer regions to have a slope larger (i.e. infinite) in comparison with a slope in a middle limit current region of the characteristic line. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Takami for the sensor of Suzuki '940 or Suzuki '940 in view of JP '388 in order to prevent excessive current flow at the outer regions of the sensor's operating range.

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10. Claims 67, 69, 93, 98, 147, and 148 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki '940 or Suzuki '940 in view of JP '388 as applied to the claims above, and in further view of Suzuki et al (USP 4,664,773) (hereafter "Suzuki '773").

11. With respect to claims, Suzuki '940 or Suzuki '940 and JP '388 set forth all the limitations of the claims, but did not explicitly recite the presence of a rich side limit to the air-fuel ratio range set at 11 or less. Suzuki '940 appears to show a limit of 12 but doesn't specify any criticality for the choice of that ratio. Suzuki '773 teaches that limit current sensors can be utilized all the way down to a λ of 0.5 (A/F of about 7.3). See fig. 5. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Suzuki '773 for the apparatus of Suzuki '940 or Suzuki '940 and JP '388 so as to extend the utility of the sensor down to even A/F ratio detection range down to even richer exhaust gases.

Response to Arguments

12. Applicant's arguments filed 12/9/2008 have been fully considered but they are not persuasive. With respect to the rejection relying on Suzuki '940, applicant urges that Suzuki '940 fails to teach the limitation concerning the width of the limit current region. This is unpersuasive for a number of reasons. However, as near as the examiner can ascertain, this phenomenon of the width of the limit current region being affected by water decomposition wasn't a new feature of the present invention *per se*, but a phenomenon observed by the inventors (specification p. 3, ll. 10-18 and p. 4, ll. 8-16). There is no indication in the specification that

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this phenomenon observed is somehow unique to the sensor of the present invention, and this observed phenomenon by the applicant would appear to be merely an inherent property of the sensors of this type in general. The fact that the applicant may have been the first to observe this phenomenon (a point the examiner will argue against below) doesn't constitute a new structural feature of the invention, and there is no reason to believe the sensor of Suzuki '940 (or any prior art sensor for that matter) would've behaved any differently than the sensor of the present invention. Hence, unless this possibly newly discovered phenomenon resulted in an apparatus whose structure reads away from the structure of apparatuses of the prior art, the prior art would still anticipate the claimed subject matter. As the examiner has discussed both above and in the 6/9/2008 office action, applicant hasn't defined an apparatus that differs from the prior art.

13. Applicant's arguments with respect to JP '388 similarly suggest that this reference failed to teach the new limitation concerning the variance of the width of the limit current region. This is unpersuasive for the same reason as discussed above for Suzuki '940. Moreover, the examiner is of the opinion that JP '388 actually recognized the observed phenomenon prior to the present inventors observing it. In particular, fig. 4 of JP '388 shows the width of the current limit region narrowing as the air/fuel ratio of the gas gets richer. Compare fig. 4 of JP '388 with fig. 5 and 6 of the present invention. Although JP '388 doesn't appear to attempt to determine the cause of this phenomenon, the examiner presumes that water decomposition must have been at least partially responsible. Furthermore, JP '388 when faced with the same problem observed by the present inventors, recognized that one should utilize a characteristic line that is shallower than a characteristic line determined by the DC impedance of the sensor (compare fig. 4 and 7). This is

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precisely analogous to what the present invention teaches doing. Compare (V_{s1} , I_{p1}) and (V_{s9} , I_{p9}) of fig. 4 of JP '388 with a3 and b3 of fig. 6 of the present invention.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KAJ K. OLSEN whose telephone number is (571)272-1344. The examiner can normally be reached on M-F 5:30-2:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kaj K Olsen/
Primary Examiner, Art Unit 1795
March 4, 2009